LISTING OF THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in this application. Added text is indicated by underlining, and deleted text is indicated by ~~strikethrough~~. Changes are identified by a vertical bar in the margin.

1. (Currently amended) A resonant element, comprising:

~~an upper~~a first conducting plane disposed in a first plane of symmetry;

~~a lower~~a second conducting plane disposed in a second plane of symmetry;

a resonant via;

~~an upper~~a first conducting pad coupled proximate to one end of the resonant via and disposed in a third plane substantially parallel to the first plane of symmetry; and

a ~~lower~~ second conducting pad coupled proximate to the other end of the resonant via and disposed in a fourth plane substantially parallel to the second plane of symmetry, wherein the resonant via is physically connected to only the first and second conducting pads.

2. (Currently amended) The resonant element of claim 1, wherein the ~~upper~~ first conducting pad is external relative to the first and second conducting planes.

3. (Currently amended) The resonant element of claim 1, wherein the ~~upper~~ first conducting pad is internal relative to the first and second conducting planes.

4. (Currently amended) The resonant element of claim 1, wherein the ~~lower~~ second conducting pad is external relative to the first and second conducting planes.

5. (Currently amended) The resonant element of claim 1, wherein the ~~lower~~ second conducting pad is internal relative to the first and second conducting planes.

6. (Original) The resonant element of claim 1, wherein the first and second conducting pads are internal relative to the first and second conducting planes.

7. (Original) The resonant element of claim 1, wherein the first and second conducting pads are external relative to the first and second conducting planes.

8. (Currently Amended) The resonant element of claim 1, wherein the first and second conducting planes are metallic layers incorporated within a multi-layer printed circuit board and the resonant via comprises a plated ~~through-hole~~ via.

9. (Currently amended) The resonant element of claim 1, wherein ~~the~~ a combined inductance and capacitance of the resonant element forms an electromagnetically resonant shunt circuit between the first and second conducting planes for a certain frequency range.

10. (Currently amended) An electromagnetically reactive structure for attenuating the propagation of electromagnetic radiation, comprising:

~~an upper~~a first conducting plane disposed in a first plane of symmetry;

a ~~lower~~ second conducting plane disposed in a second plane of symmetry;

a plurality of resonators, each of the plurality of resonators comprising:

a resonant via,

~~an upper~~a first conducting pad coupled proximate to one end of the resonant via and disposed in a third plane substantially parallel to the first plane of symmetry, and

a ~~lower~~ second conducting pad coupled proximate to the other end of the resonant via and disposed in a fourth plane substantially parallel to the second plane of symmetry, wherein the resonant via is physically connected to only the first and second conducting pads.

11. (Original) The electromagnetically reactive structure of claim 10, wherein the plurality of resonators are disposed in a two-dimensional periodic array lying between the first and second conducting planes.

12. (Original) The electromagnetically reactive structure of claim 10, wherein the first and second conducting planes comprise a waveguide, and wherein the plurality of resonators are interposed between the first and second conducting planes.

13. (Currently amended) The electromagnetically reactive structure of claim 12, wherein ~~the number~~a quantity, geometry, inductance, and capacitance of the discrete conductors effects an electromagnetic stop band within the waveguide.

14. (Original) The electromagnetically reactive structure of claim 13, wherein the plurality of resonators are disposed in two dimensions with spacing less than about one-half the wavelength of the desired stop band frequency.

15. (Currently amended) The electromagnetically reactive structure of claim 10, wherein the ~~upper~~ first conducting pad for at least some of the plurality of resonators is external relative to the first and second conducting planes.

16. (Currently amended) The electromagnetically reactive structure of claim 10, wherein the ~~upper~~ first conducting pad for at least some of the ~~plurality~~ resonators is internal relative to the first and second conducting planes.

17. (Currently amended) The electromagnetically reactive structure of claim 10, wherein the ~~lower~~ second conducting pad for at least some of the resonators is external relative to the first and second conducting planes.

18. (Currently amended) The electromagnetically reactive structure of claim 10, wherein the ~~lower~~ second conducting pad for at least some of

the ~~plurality of~~ resonators is internal relative to the first and second conducting planes.

19. (Original) The electromagnetically reactive structure of claim 10, wherein the first and second conducting pads for at least some of the resonators are internal relative to the first and second conducting planes.

20. (Original) The electromagnetically reactive structure of claim 10, wherein the first and second conducting pads for at least some of the resonators are external relative to the first and second conducting planes.

21. (Currently Amended) The electromagnetically reactive structure of claim 10, wherein the first and second conducting planes are metallic layers incorporated within a multi-layer printed circuit board and the resonant via comprises a plated ~~through-hole~~ via.

22. (Currently amended) The electromagnetically reactive structure of claim 10, wherein ~~the~~ a combined inductance and capacitance of the resonant element for each of the plurality of resonators forms an electromagnetically resonant shunt circuit between the first and second conducting planes for a certain frequency range.

23. (Currently amended) A layered assembly, comprising:

~~an uppera~~ first conducting plane disposed in a first plane of symmetry;

a ~~lower~~ second conducting plane disposed in a second plane of symmetry; and

an electromagnetically reactive structure for attenuating the propagation of electromagnetic radiation, including a plurality of resonators, each of the plurality of resonators comprising:

a resonant via,

~~an upper~~a first conducting pad coupled proximate to one end of the resonant via and disposed in a third plane substantially parallel to the first plane of symmetry, and

a ~~lower~~ second conducting pad coupled proximate to the other end of the resonant via and disposed in a fourth plane substantially parallel to the second plane of symmetry, wherein the resonant via is physically connected to only the first and second conducting pads.

24. (Original) The layered assembly of claim 23, wherein the plurality of resonators are disposed in a two-dimensional periodic array lying between the first and second conducting planes.

25. (Original) The layered assembly of claim 23, wherein the first and second conducting planes comprise a waveguide, and wherein the plurality of resonators are interposed between the first and second conducting planes.

26. (Currently amended) The layered assembly of claim 25, wherein ~~the number~~a quantity, geometry, inductance, and capacitance of the resonators effects an electromagnetic stop band within the waveguide.

27. (Original) The layered assembly of claim 25, wherein the plurality of resonators are disposed in two dimensions with spacing less than about one-half the wavelength of the desired stop band frequency.

28. (Currently amended) The layered assembly of claim 23, wherein the ~~upper~~ first conducting pads for at least some of the plurality of resonators are external relative to the first and second conducting planes.

29. (Currently amended) The layered assembly of claim 23, wherein the ~~upper~~ first conducting pads for at least some of the plurality are internal relative to the first and second conducting planes.

30. (Currently amended) The layered assembly of claim 23, wherein the ~~lower~~ second conducting pads for at least some of the resonators are external relative to the first and second conducting planes.

31. (Original) The layered assembly of claim 23, wherein the ~~lower~~ second conducting pads for at least some of the plurality of resonators are internal relative to the first and second conducting planes.

32. (Original) The layered assembly of claim 23, wherein the first and second conducting pads for at least some of the resonators are internal relative to the first and second conducting planes.

33. (Original) The layered assembly of claim 23, wherein the first and second conducting pads for at least some of the resonators are external relative to the first and second conducting planes.

34. (Original) The layered assembly of claim 23, wherein the first and second conducting planes are metallic layers incorporated within a multi-layer printed wiring board and the resonant via comprises a plated via.

~~36~~35. (Currently amended) The layered assembly of claim 23, wherein ~~the~~ a combined inductance and capacitance of the resonant element for each of the plurality of resonators forms an electromagnetically resonant shunt circuit between the first and second conducting planes for a certain frequency range.

~~37~~36. (Currently amended) The layered assembly of claim 23, wherein the layered assembly is a printed circuit board.

~~38~~37. (Currently amended) The layered assembly of claim 23, wherein the layered assembly is an integrated semiconductor chip.

~~39~~38. (Currently amended) The layered assembly of claim 23, wherein the layered assembly is a multi-chip module.

~~40~~39. (Withdrawn) An electromagnetically reactive structure for attenuating the propagation of electromagnetic waves comprising:

a first conducting plane disposed within a first plane of symmetry in a three-dimensional periodic loaded wire media model,

a second electrically isolated conducting plane disposed within a second plane of symmetry in a three-dimensional periodic loaded wire media model, thereby forming a parallel plate waveguide, and

a plurality of resonators, each resonator of the plurality embodying a truncated segment of the three-dimensional periodic loaded wire media model and for which some portion thereof is external to at least one of the conducting planes for at least some resonators of the plurality.

~~41~~40. (Withdrawn) The electromagnetically reactive structure of claim ~~40~~39, wherein the number resonators in the plurality of resonators and the location, capacitance, and inductance of each resonator of the plurality is selected to achieve an electromagnetic stop band within the waveguide.

~~42~~41. (Withdrawn) The electromagnetically reactive structure of claim ~~41~~40, wherein the electromagnetic stop band is selected to block transverse propagation of undesirable signals comprising frequencies within the stop band.

~~43~~42. (Withdrawn) The electromagnetically reactive structure of claim ~~40~~39, wherein the first and second conducting planes are metallic layers incorporated within a multi-layer preformed panel circuit.

[~~44~~]43. (Withdrawn) The electromagnetically reactive structure of claim ~~40~~39, wherein each resonator of the plurality comprises a plated through-hole via.

~~45~~44. (Withdrawn) The electromagnetically reactive structure of claim ~~44~~43, wherein each resonator of the plurality comprises a first conducting pad coupled with a plated through-hole via proximate the first end, wherein

the first pad for at least some resonators of the plurality is in a first plane that is parallel and external to the first conducting plane.

~~46~~45. (Withdrawn) The electromagnetically reactive structure of claim ~~45~~44, wherein the first conducting pad for at least some resonators of the plurality is in a second plane that is parallel with and internal to the first conducting plate.

~~47~~46. (Withdrawn) The electromagnetically reactive structure of claim ~~46~~45, wherein at least some resonators of the plurality comprise a second conducting pad, and wherein the second conducting pad for at least some resonators of the plurality is in a third conducting plane that is parallel with and internal to the second conducting plane.

~~48~~47. (Withdrawn) The electromagnetically reactive structure of claim ~~47~~46, wherein the second conducting pad for at least some resonators of the plurality is in a fourth conducting plane that is parallel with and external to the second conducting plane.

~~49~~48. (Withdrawn) The electromagnetically reactive structure of claim ~~45~~44, wherein the first pad for at least some resonators of the plurality is in a second plane that is parallel with and external to the second conducting plate.

~~50~~49. (Withdrawn) The electromagnetically reactive structure of claim ~~45~~44, wherein the first pad for at least some of the plurality of resonators is in

a second plane that is parallel with and internal to the second conducting plane.

~~51~~50. (Currently amended) An electromagnetically reactive structure of claim 10 wherein some of the resonators form a periodic array having a first period, and the remainder of the resonators form a periodic array having a second period that is an integer multiple of the first period.

~~52~~51 (Currently amended) The layered assembly of claim 23 wherein some of the resonators comprise a periodic array having a first period, and the remainder of the resonators comprise a second periodic array having a second period that is an integer multiple of the first period.

~~53~~52. (Withdrawn) The electromagnetically reactive structure of claim ~~40~~ 39 wherein some of the resonators comprise a periodic array having a first period, and the remainder of the resonators comprise a second periodic array having a second period that is an integer multiple of the first period.

53. (New) The electromagnetically reactive structure of claim 10 wherein some of the resonators form a periodic array having a first period, and the remainder of the resonators form a periodic array having a second period.

54. (New) The electromagnetically reactive structure of claim 10 wherein sets of the resonators form periodic structures having different periods.

55. (New) The layered assembly of claim 23 wherein some of the resonators form a periodic array having a first period, and the remainder of the resonators form a periodic array having a second period.

56. (New) The layered assembly of claim 23 wherein sets of the resonators form periodic structures having different periods.

57. (New) A resonant element, comprising:

a first conducting plane disposed in a first plane of symmetry;

a second conducting plane disposed in a second plane of symmetry;

a resonant via;

a first conducting pad coupled proximate to one end of the resonant via and disposed in a third plane substantially parallel to the first plane of symmetry; and

a second conducting pad coupled proximate to the other end of the resonant via and disposed in a fourth plane substantially parallel to the second plane of symmetry, wherein the resonant via is electrically coupled to only the first and second conducting pads at all frequencies and is also capacitively coupled to the first and second conducting planes.

58. (New) A resonant element, comprising:

a first conducting plane disposed in a first plane of symmetry;

a second conducting plane disposed in a second plane of symmetry;

a resonant via;

a plurality of conducting pads coupled to the resonant via, wherein the resonant via is electrically coupled to only the plurality of conducting pads at all frequencies and is also capacitively coupled to the first and second conducting planes.

59. (New) A resonant element, comprising:

a first conducting plane disposed in a first plane of symmetry;

a second conducting plane disposed in a second plane of symmetry;

a resonant via comprising inductance and capacitance, wherein the inductance and capacitance are selected to cause a first impedance-between the resonant via and the first and second conducting planes at desired frequencies and a second impedance is present between the resonant via and the first and second conducting planes at all other frequencies, wherein the first impedance is substantially less than the second impedance.

60. (New) A resonant element, comprising:

a first conducting plane disposed in a first plane of symmetry;

a second conducting plane disposed in a second plane of symmetry;

a resonant via comprising a first conducting pad disposed in a third plane between the first and second conducting planes and substantially parallel to the first plane of symmetry, and a second conducting pad disposed in a fourth plane between the first and second conducting planes and substantially parallel to the second plane of symmetry and capacitively coupled to the first conducting pad, wherein a first conducting rod connects

the first conducting pad to the first conducting plane, and a second conducting rod connects the second conducting pad to the second conducting plane.

61. (New) A resonant element, comprising:

a first conducting plane;

a second conducting plane; and

a resonant via that is capacitively coupled to the first and second conducting planes, wherein the resonant via comprises an inductance.

62. (New) The resonant element of claim 61, wherein the resonant via further comprises:

a first conducting pad proximate to one end of the resonant via and disposed in a third plane substantially parallel to the first conducting plane; and

a second conducting pad proximate to the other end of the resonant via and disposed in a fourth plane substantially parallel to the second conducting plane, wherein the first conducting pad is proximate to the first conducting plane and the second conducting pad is proximate to the second conducting plane.